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# Burnt Corral Vegetation Management Project

## Biological Evaluation and Wildlife Specialist's Report

**North Kaibab Ranger District, Kaibab National Forest  
Coconino County, Arizona**



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## Introduction

The purpose of this Biological Evaluation/Specialist Report is to disclose existing conditions that occur within the Burnt Corral Vegetation Management Project (BCVMP), and to identify the likely effects of the proposed action to endangered, threatened, proposed, and Forest Service sensitive species (TES), rare and narrow endemic wildlife species, bald and golden eagles and migratory bird priority species that may occur or may have habitat within the project area. This specialist report was developed in consideration of the best available science.

Separate specialists' reports address old-growth forest, TES plants, non-native and invasive species, rangeland ecology and management, and other resources of concern to wildlife (see the project file for these and all other specialists' reports mentioned in this report).

## Relevant Laws, Regulations and Policy

This document ensures that the Kaibab National Forest (KNF) is in compliance with a number of authorities that apply to wildlife conservation and management, including the following:

- National Forest Management Act of 1976, as amended
- Endangered Species Act of 1973, as amended
- National Environmental Policy Act of 1969, as amended
- Multiple-Use Sustained Yield Act of 1960, as amended
- The Bald and Golden Eagle Protection Act of 1940, as amended
- Migratory Bird Treaty Act of 1918, as amended
- Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds

## Direction from Forest Service Manuals

The Forest Service is legally required to comply with directives from Forest Service Manuals (<http://www.fs.fed.us/im/directives/dughtml/fsm.html>), including those that apply to federally listed Endangered, Threatened and Candidate Species and Forest-Service Sensitive Species.

### Federally Listed Endangered, Threatened and Candidate Species

The Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*) and reiterated in FSM 2670.11-2670.46 directs how the National Forest System works with the Fish and Wildlife Service (FWS) to promote the recovery of species covered under the ESA.

### Forest Service Sensitive Species

Forest Service Sensitive species are defined as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: a) significant current or predicted downward trends in population numbers or density, or b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5(19)). It is the policy of the Forest Service regarding sensitive species to 1) assist states in achieving their goals for conservation of endemic species, 2) as part of the National Environmental Policy Act (NEPA) process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species, 3) avoid or minimize impacts to species whose viability has been identified as a concern, 4) if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole (the Line Officer, with project approval authority, makes the decision to allow or disallow impacts, but the decision must not result in loss of species viability or create significant trends toward federal listing), and 5) establish management objectives in cooperation with the state when projects on National Forest system lands may have a significant effect

on sensitive species population numbers or distributions. Establish objectives for federal candidate species, in cooperation with the U.S. Fish and Wildlife Service and Arizona State (FSM 2670.32).

## Land and Resource Management Plan

The Kaibab National Forest Land and Resource Management Plan (LRMP, USDA 2014) provides guidelines for managing wildlife, including federally listed, Forest Service Sensitive, and rare and narrow endemic species.

- Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors.
- Project activities and special uses should incorporate recommended measures for golden eagle management such as temporary closures to limit human disturbance in the vicinity of golden eagle nests.
- Potentially disturbing project-related activities should be restricted within 300 yards of active raptor nest sites between April 1 and August 15.
- Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.
- Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive species.
- Activities occurring near areas used by bald eagles should follow recommendations identified in the National Bald Eagle Management Guidelines and Arizona Conservation Assessment and Strategy for the Bald Eagle.
- A minimum of six goshawk nest areas (known and replacement) should be located per territory. Nest areas and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size.
- Northern goshawk post-fledging family areas (PFA's) of approximately 420 acres in size should be designated surrounding the nest sites.
- Potentially disturbing project related activities should be minimized in occupied northern goshawk nest areas during the nesting season of March 1 through September 30.
- Project design should incorporate measures to protect and provide for rare and narrow endemic species where they are likely to occur.

The LRMP also provides desired conditions for wildlife including federally listed, Forest Service Sensitive, and rare and narrow endemic species.

- Native wildlife species are distributed throughout their potential natural range. Desirable nonnative wildlife species are present and in balance with healthy, functioning ecosystems.
- Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species.
- Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for.
- Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites.
- Interconnected forest and grassland habitats allow for movement of wide ranging species and promote natural predator-prey relationships, particularly for strongly interactive species (e.g., mountain lions).
- Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promote genetic flow between wildlife populations.
- Human-wildlife conflicts are minimal. Hunting, fishing and other wildlife based recreation opportunities exist, but do not compromise species populations or habitat.
- Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest.

- Habitat and refugia are present for narrow endemics or species with restricted distributions and/or declining populations.
- Location and conditions of rare and narrow endemic species are known.

In addition to the LRMP guidelines best management practices and mitigation measures identified during the collaborative development of the proposed action are included (Sisk et al 2014).

## Proposed Action

This Proposed Action is stratified based on treatment types and relevant vegetation. The proposed treatments include some fire-only treatments and some treatments using both mechanical treatments and fire (Table 1). See the BCVMP Environmental Assessment (EA) for details on the purpose and need for action and for full descriptions of the proposed action, mitigation measures, and desired conditions.

**Table 1.** Burnt Corral Vegetation Management Project treatments.

Treatment Type(s) Proposed	Relevant Strata	Maximum Estimated Acreage
<b>Wildland Fire</b>		
Fire only <sup>1</sup>	Ponderosa pine plantations, Bridger fire area, sensitive soils, steep slopes, seed cuts approaching desired conditions	12,990
<b>Mechanical Thinning and Wildland Fire:</b>		
Thin mixed conifer from below to 12"	Mexican Spotted Owl Habitat	358
Thin from below to 14"	Northern Goshawk Nest Areas	2,580
Thin from below to 16"	Old Growth Ponderosa Pine	2,600
Create .5-3 acre early seral openings on 10%, thin to 80 basal area on 90%	Ponderosa Pine Creating Early Seral Openings	9,530
<b>Total Project Area</b>		<b>28,060</b>

<sup>1</sup> This includes activities such as preparation thinning and other light mechanical and hand thinning treatments associated with appropriate use and management of prescribed fire and managed wildfire.

## No Action

Under the No Action alternative there would be no mechanical vegetation treatments or prescribed burning treatments. Management of wildland fire could still occur. Disturbances as a result of project implementation would not occur. No restoration efforts would take place and fuels hazard reduction would not occur, except as a result of managed wildland fire.

## Species Evaluation

## Federally Listed Species

Table 2 shows the project-specific species list provided by USFWS for BCVMP. Only these species will be analyzed here, other species that do not occur on the NKR D would not be impacted by the proposed project.

**Table 2.** Effects determinations for wildlife species and critical habitats in USFWS official species list.

Species Name	Critical Habitat in Project Area?	Determination	Rationale
California condor <i>Gymnogyps californianus</i> (experimental population, non-essential)	No	Would not jeopardize the continued existence of population	See below
Mexican spotted owl <i>Strix occidentalis lucida</i>	Yes	May effect, not likely to adversely affect species, its habitat, and/or designated critical habitat.	See below
Yellow-billed cuckoo <i>Coccyzus americanus</i> (Western DPS)	No	No effect	No detections or suitable habitat in project area.
Northern Mexican gartersnake <i>Thamnophis eques megalops</i>	No	No effect	No detections or suitable habitat in project area.
Humpback chub <i>Gila cypha</i>	No	No effect	No detections or suitable habitat in project area. USFS would implement soil and watershed best management practices.
Razorback sucker <i>Xyrauchen texanus</i>	No	No effect	No detections or suitable habitat in project area. USFS would implement soil and watershed best management practices.

### California Condor

#### Existing Condition

The Utah/Arizona population of California condor is an experimental, nonessential population. The California condor was reintroduced to the Arizona Strip starting in 1996, with releases on the Vermillion Cliffs above House Rock Valley just east of the border of the NKR D. Additional releases have occurred in both House Rock Valley and the Hurricane Cliffs to the west of NKR D. Condor use of the NKR D is year-round, including foraging and nesting. Depending on the time of year and food availability, the number of condors on the District at any one time may vary. Condors have been extensively radio-tracked and have been detected flying over, foraging and roosting on the District. Condors may use the project area for foraging and resting, but not likely for nesting.

#### Direct and Indirect Effects

##### Proposed Action

The measures in Appendix A would mitigate most short-term effects to the California condor. Noise from mechanical treatments, road maintenance/improvement, and helicopters may cause short-term avoidance of foraging in some areas during treatment. Similarly, smoke associated with prescribed fire may limit visibility impacting foraging in some areas while treatments are being conducted. However, prescribed fire and thinning may benefit foraging condors over the long term by creating more open forest conditions. The increased herbaceous forage would result in enhanced mule deer habitat, and mule deer carrion is a major source of food for condors on the Kaibab plateau.

##### No Action

The improved foraging and carrion availability to condors would not occur if no action were taken, unless there was a large wildfire. The no action would result in accumulation of fuels and potential for high-intensity wildfire, such as the 2006 Warm Fire. The Warm Fire is heavily used by condors for feeding and roosting.

#### Determination

The proposed action may result in some short-term avoidance but would not jeopardize the continued existence of the California condor because the project does not treat condor nesting habitat and mitigation measures would minimize other effects. The proposed action may have long-term benefits for the species by creating some openings in the forest, increasing the availability of carrion.

#### Mexican Spotted Owl

##### Existing Condition

The NKRD is located in the Colorado Plateau (CP) Ecological Management Unit (EMU) as defined in the Mexican Spotted Owl Recovery Plan (USFWS 2012). MSO primarily utilize canyon habitat in the Grand Canyon National Park to the south of NKRD (Bowden et al. 2008) and in southern Utah to the north of NKRD (Rinkevich and Gutiérrez 1996; Willey and Van Riper 2007). Bowden et al. (2008) found that most MSO detections that occurred outside of canyon habitat were within 0.5 miles of the rim of the Grand Canyon. MSO surveys on the NKRD have been conducted at over 1700 points spanning more than 30 years (NKRD wildlife files). Although there have been MSO detections, some more reliable than others, follow-up surveys have never verified MSO residence on the NKRD.

Two categories of MSO designated critical habitat are described in the recovery plan (USFWS 2012): protected activity centers (PACs) and recovery habitat. The NKRD does not have any PACs. District-wide, 54,617 acres of recovery habitat has been identified, 25% of which is classified as nesting/roosting based on an examination of habitat conditions (USFS 2014). Within the project area, there are 358 acres of MSO recovery habitat, but no nesting/roosting habitat. The effects analyses presented below are specific to these 358 acres.

#### Direct and Indirect Effects

##### Proposed Action

Within MSO recovery habitat, the proposed action for mechanical treatment would: 1) retain all trees above 12"DBH. Trees would be thinned from below, up to 12" to reach proposed 120 sq. feet/acre basal area, in some areas thinning only to 9"DBH may occur to meet desired condition; 2) Maintain large snags (>18"DBH), large downed logs (>18"DBH) and large trees (>18"DBH); and 3) Aspens, a key component of hardwoods, would not be mechanically treated but could be thinned by burning. The proposed use of wildland fire is not expected to change large tree density, snag density, or ground layer species richness and cover in low and moderate-low severity areas within MSO Recovery Habitat. A decrease in small diameter trees is expected, which would result in a decrease in the overall basal area and canopy cover (Table 3). Data collected by the Grand Canyon Fire Effects Team on the Range and Thompson prescribed fires, conducted in mixed conifer on the Kaibab Plateau, indicated no changes in the number of large (>16" DBH) conifers, and 0% and 7% reduction in the average number of intermediate (6 – 16" DBH) conifers respectively (GRCA 2012). Wildland fires are managed to burn in a mosaic, leaving some areas with little to no fire effects. Furthermore, by restoring stand conditions and beneficial fire regimes, the BCVMP would reduce the potential for high-severity wildfire, which is listed as one of the primary threats to MSO habitat (USFWS 2012).

**Table 3.** Forest Vegetation Simulation models for before and after proposed action (thinning followed by prescribed burning after a one year rest) within the 358 acres of MSO Critical Habitat for BCVMP.

TYPE	EXISTING CONDITION (2014)	NO ACTION		PROPOSED ACTION	
		2018	2034	2018	2034
Basal Area (sq. ft. per acre)	184	198	239	191	155
Basal Area for saplings – 12" DBH (in percentage)	37	70	35	37	15



Basal Area for 12" – 24" DBH (in percentage)	29	71	38	37	45
Basal Area for >24" DBH (in percentage)	46	50	27	26	40
Trees per Acre (18" – 24" DBH)	14	15	19	15	18
Trees per Acre (greater than 24" DBH)	11	12	15	12	14
Snags (greater than 14' DBH)	3	2	3	9	3
Downed Woody Debris (tons per acre)	1	1	2	1	3
Canopy Cover (percentage)	70	67	71	56	50

Minimal effects to MSO designated critical habitat are expected from the BCVMP on the 358 acres of recovery habitat. By conducting understory thinning and prescribe fire operations, surface fuel loads and basal areas would be reduced, canopy base heights would be increased, large diameter trees would become more resistant to fire, and the growth of fire-resistant tree species such as pine and aspen would be promoted. Over the life of the project, tree stand density within the project area would be reduced by removing trees <12" DBH in the mixed conifer (i.e., a more desirable condition for the forest (USDA 2014).

One of the goals of the proposed action is to improve habitat and retain key MSO Recovery habitat variables and critical habitat primary constituent elements. During prescribed burning treatments, as noted above, isolated or small-scale group torching fire behavior may occur, but this is not desired and would be avoided to the degree possible.

#### No Action

No action would affect key habitat elements (large trees, large snags, and large logs, hardwoods, etc.) similarly to the proposed action (Table 3). However, MSO habitat would be at greater risk of high-intensity wildfire with no action, which can eliminate large areas of MSO habitat as did the 2006 Warm Fire. This type of fire is currently considered the biggest threat to MSO (USFWS 2012).

#### Determination

BCVMP may affect but is not likely to adversely affect Mexican spotted owls, their habitat, and/or designated Critical Habitat. The amount of MSO Critical Habitat proposed to be treated is small (358 acres), amounting to less than 1% of suitable habitat on the NKR. The proposed activities within and surrounding MSO Critical Habitat would benefit MSO by reducing the potential for high-intensity crown fire. Per the requirements of section 7(a)(2) of the Endangered Species Act, the USFS consulted with USFWS regarding BCVMP. The USFWS has concurred with the determination above (USFWS 2018).

#### Forest Service Sensitive Species

There are 12 wildlife species on the FS's Region 3 Regional Forester's Sensitive Species 2013 list that occur on the KNF. The KNF has developed a list (Kaibab 2014) that identifies which species occur in which district(s). Table 4 shows the FS Sensitive species that occur on the NKR. All other species on the list do not occur on the NKR and would not be impacted by the proposed project.

**Table 4.** Forest Service Sensitive Species

Species	Habitat Description	Habitat in project boundary
Northern leopard frog <i>Rana pipiens</i>	Breeds in shallow, permanent bodies of water. Currently in refugia ponds in House Rock Valley.	No, no further analysis required.
Bald eagle	Winter resident on NKR.	Yes

<i>Haliaeetus leucocephalus</i>		
Northern goshawk <i>Accipiter gentilis</i>	Ponderosa pine and mixed conifer forests on NKRD.	Yes
American peregrine falcon <i>Falco peregrinus anatum</i>	Cliffs (foraging areas to be considered)	Yes
Kaibab fairy shrimp <i>Branchinecta kaibabensis</i>	Dry lakes and vernal pools	Yes
Spotted bat <i>Euderma maculatum</i>	Roosts in crevices in cliffs or under loose rocks, forages on NKRD	Yes
Allen's lappet-browed bat <i>Idionycteris phyllotis</i>	Ponderosa pine, pinyon-juniper, roosts in caves and abandoned mineshafts, forage on NKRD	Yes
Pale Townsend's big-eared bat <i>Corynorhinus townsendii pallescens</i>	Hibernates in caves where the temperature is 54 F or less but usually above freezing, forages on NKRD	Yes
House Rock Valley chisel toothed kangaroo rat <i>Dipodomys microps leucotis</i>	Shrub dominated Great Basin desert scrub communities in House Rock Valley.	No, no further analysis required.

## Bald Eagle

### Existing Condition

The bald eagle was removed from the list of threatened and endangered species in 2007 (FWS 2007). Eagles are currently protected under the Bald and Golden Eagle Protection Act and are a Forest Service sensitive species. There are no documented bald eagle nest sites located on the NKRD. Individual eagles may be seen flying over or foraging on the NKRD during the winter months or foraging on carrion along major roads or in areas where winter kill may have occurred. Bald eagles have been sighted at Big Springs Administrative Site feeding on trout from the ponds. Brown (1993) observed bald eagles foraging in Grand Canyon National Park along the Colorado River and Nankoweap Creek. Bald eagles favor large trees for winter roosting that provides shelter from weather (FWS 2007). Within the project area an adult bald eagle has been seen perched in a snag (Dastrup, personal observation). Bald eagles prefer large bodies of water for nesting (Peterson 1986). The NKRD does not have any large bodies of water, therefore it does not support large concentrations of bald eagles.

### Direct and Indirect Effects

#### Proposed Action

Migratory bald eagles typically arrive in northern Arizona in October and leave in April with adults more common in the fall and immature birds more abundant in January through April (Grubb 2003). Eagles would avoid areas with nearby human activity and development (Buehler et al. 1991). Direct effects to bald eagles may occur from noise associated with implementing proposed activities such as mechanical treatments and prescribed burning. Indirect effects from smoke may temporarily displace roosting bald eagles. However, project implementation is not likely to occur during the winter when eagles are most likely to be present. Indirect effects may occur from the loss of large snags due to prescribed fire, however snag mortality during prescribed fire usually only occurs on older, weaker snags (ERI 2007). Bald eagles may benefit from increased availability of mule deer carrion, like California condors (see above).

#### No Action

Bald eagles would not be temporarily displaced by noise or smoke if no action were taken, except in the event of a wildfire. The area would be at an elevated risk for high-intensity wildfire, which would destroy sheltered wintering snags. The improved carrion availability to eagles would not occur if no action were taken, unless there was a large wildfire.

### Determination

Potential displacement associated with the project would be short-term and limited in frequency. The proposed action would not affect or cause a trend towards future listing of bald eagles or their habitat.

## Northern Goshawk

### Existing Condition

For 20 years the northern goshawk (goshawk) was extensively monitored by the Rocky Mountain Research Station; data from that work will be used in this analysis. Eighteen territories lie wholly or partially within the BCVMP footprint and each territory, per the LRMP, manages for six nest areas. There are 96 nest areas overlapping or within the project area, 62 of these are replacement nests as defined by the Kaibab Forest Plan, the others have been used at least once within the recent history; some of the nests have been used multiple years (NKRDL wildlife files). Goshawks nest in coniferous, deciduous, and mixed forests and use a variety of forest types, ages, structure, and successional stages (Reynolds et al. 1992). The BCVMP area consists mostly of ponderosa pine habitat. Nest areas for the goshawk in BCVMP are 30 acres circular centered on the nest. Nests tend to be on northerly aspects surrounded by one or more groups of large trees with interlocking canopies (Reynolds et al. 1992).

Surrounding the nest area is the post-fledging family area (PFA) or territories which averages about 420 acres and generally corresponds to the territory that the goshawk will defend and where fledglings will learn to hunt (USDA 2014, Reynolds et al. 1992). The PFA exists in a variety of forest types and conditions that provides habitat for a variety of prey (Reynolds et al. 1992).

The northern goshawk's diet consists of a variety of prey species including squirrels, rabbits, woodpeckers, and other small mammals and birds (Reynolds et al. 2017). This variety in prey requires a variety in forest structure including patches of dense trees, large trees, herbaceous or shrubby understories, small openings in the forest, snags, downed logs, and other habitat attributes specific to various prey species (Reynolds et al. 1992).

### Direct and Indirect Effects

#### *Proposed Action*

The proposed action would improve forest health and sustainability by reducing the risk of stand replacing wildfire. Opening the canopy through thinning would allow additional moisture and sunlight to reach the forest floor promoting grass and forbs sprouting (Abella et al. 2006). In addition, new open areas create favorable conditions for remaining trees to expand their root system for nutrient and moisture intake. This reduces the stress on the clumps and groups of trees enabling them to grow faster and be more resistant to fire, disease and drought. Finally, it provides the space needed for seedling tree regeneration allowing for increased diversity of the herbaceous understory and providing for more of a mosaic of age and structural classes that provide functional habitat conditions for a broad spectrum of wildlife species, including goshawk prey species.

Prior to mechanical treatments, goshawk nest surveys would be conducted. If an active nest is detected, potentially disturbing activities would not occur within 300 yards from March 1 through September 30. There are potential direct effects from prescribed burning that could affect nesting and feeding behavior. Goshawk may be flushed from nest sites and/or change foraging behavior due to smoke accumulation. However, over the years as many as 7 territories/nest areas under-burned during the breeding season (eggs or young in nest), and in only one of these cases did the nest attempt fail. The one nest failure may have been due to significant period of rain as many other active nests without fire also failed during this time (Reynolds et al. 2017).

Prescribed burning or mechanical treatment activities may affect goshawks by changing their habitat structure (snags, downed logs, woody debris, vegetative structural stages, and dense canopy cover). Currently, the project area, is sufficient in coarse woody debris, ~2 snags/acre, 3 downed logs/acre and 9-10 tons per acre of downed woody material (Silviculturist Report 2016). Prescribed fire may consume some snags and woody debris but would also produce these habitat features. Mechanical treatment would retain snags in accordance with LRMP guidelines. Effects to nesting area habitat would be reduced by retaining large trees >14" DBH. Activities may change the structure of goshawk prey species' habitat, affecting the abundance and composition of prey species. Although treatments may have adverse effects to prey species and their habitat in the short term, returning forest structure to a fire adaptive ecosystem would increase habitat diversity, resulting in a more robust prey assemblage for goshawks in the long term (Reynolds et al. 2013).

#### *No Action*

Goshawks would not be affected by prescribed fire or mechanical treatments for the no action alternative. FVS models indicate that, within ponderosa pine stands, basal area and stand density index would increase with no action

Silviculturalist's BCVMP Report), resulting in a very high potential for disturbance as either wildfire or insect/disease outbreaks. The 2006 Warm Fire resulted in almost 12,000 acres of nearly 100% vegetation mortality within ponderosa pine forest (USDA Forest Service 2007), and complete loss of goshawk habitat.

#### **Determination**

The retention of large trees >14" DBH within nesting areas and nest surveys prior to mechanical treatment would mitigate effects to nest areas and active nests. The proposed treatment would create a fire-resilient mosaic benefitting goshawk prey species. The proposed action may temporarily impact individuals but would not cause a trend towards future listing for the northern goshawk.

### **American Peregrine Falcon**

#### **Existing Condition**

On the NKRD peregrine falcons utilize the cliffs of Kanab Creek and Saddle Mountain Wildernesses for nesting. There are also documented eyries on the cliffs of Oak, Oquer, and Valley Canyons. Peregrine falcons are known to travel long distances to forage as documented by Enderson and Craig (1997). Peregrine falcons have been seen foraging in DeMotte, Pleasant Valley, Lookout Canyon, and Dry Park meadows during the summer months (personal observation). Individuals may be seen foraging in meadow like features in and near the project area. Peregrine falcons' prey includes other birds, mammals, and insects. Ellis et al. (2004) found that 98% of the prey remains from peregrine falcons in Arizona were birds, although Stevens et al. (2009) found that although birds made up the majority of foraging targets, bats (10%) and large wasps (8%) were also foraged on by peregrine falcons in Glen Canyon and Grand Canyon National Parks.

#### **Direct and Indirect Effects**

##### *Proposed Action*

There is no known nesting habitat within the project area, however, the known Oquer Canyon eyrie is located approximately ½ mile from the eastern edge of the project boundary. Noise impacts to the eyrie would not occur as no potentially disturbing project activities would occur within 300 yards of an active nest, per LRMP guidelines. Foraging habitat can be found in the project area. The proposed action would result in a more diverse vegetative structure, providing for an increase in diversity of bird and other prey species. Direct effects to the Peregrine falcon could result from temporary displacement of any foraging individuals during treatment activities. Effects would be minimal as the birds are known to forage over vast areas. Peregrine falcons in Colorado apparently obtained prey in widely separated places with no apparent dependence on any certain area (Enderson and Craig 1997).

##### *No Action*

If the no action alternative were chosen, peregrine falcons would not be temporarily displaced by noise or smoke while foraging. They would not benefit from the proposed mosaic of forest stand conditions, and the associated increase in diversity of prey species. No action would lead to increased probability of high-intensity wildfire like the 2006 Warm Fire, which is likely to be preferred foraging habitat compared to dense ponderosa pine forest.

#### **Determination**

The proposed action does not affect nesting habitat. Individuals may be temporarily displaced by noise or smoke while foraging but would not cause a trend towards future listing for peregrine falcon.

### **Kaibab Fairy Shrimp**

#### **Existing Condition**

Kaibab fairy shrimp are found in dry lakes and vernal pools on NKRD south of Jacob Lake, AZ. Belk and Fugate (2000) believe there are relatively few impacts to Kaibab fairy shrimp or their habitats due to the lack of human disturbance to the pools. Kaibab fairy shrimp may occur in the project area.

#### **Direct and Indirect Effects**

##### *Proposed Action*

Although fairy shrimp have not been found in the project area, potential habitat (i.e. snowmelt pools, sinkholes, and ponds) does occur there. According to Belk (1977) the two main factors that could impact fairy shrimp are salinity and seasonal variation of water levels in ponds. Attachment A of the proposed action has mitigation measures and

best management practices specifically for soil and watersheds along with Forest Plan management of natural waters which would decrease the potential for unnatural change of salinity and water level within the natural waters in the Burnt Corral project area.

#### *No Action*

If the no action alternative were chosen, the project area would experience elevated risk for high-intensity wildfire. Natural waters may be significantly impacted from runoff in the event of a large high-intensity wildfire.

#### **Determination**

The proposed action would not cause a trend toward future listing of Kaibab fairy shrimp. Soil and watershed best management practices during mechanical thinning and fire management would mitigate effects to natural waters.

### Bats (Spotted, Allen's Lappet-Browed and Pale Townsend's Big-eared)

#### **Existing Condition**

Spotted bats on the NKRD roost in the crevices of cliffs or loose rocks. Spotted bats will use a variety of habitats when foraging such as open woodlands and forest meadows (Chambers et al. 2011), all of which can be found in the project area. Spotted bats have been documented traveling 38.5 km to forage in meadows on the NKRD and will roost in trees around the meadows for a few hours before returning to their roosts in canyon cliffs (Rabe et al. 1998).

Allen's lappet-browed bats use large ponderosa pine snags with sloughing bark or vertical cracks created by lightning strikes as primary roost sites (Rabe, et al. 1998b, Solveskey et al. 2009). Bats may move between snag roosts for a variety of reasons (i.e. reduce parasite load, to avoid predation, changing roost conditions) and it is important to leave a sufficient amount of snags in the area (Rabe et al. 1998b). The KNF Desired Conditions for snags in ponderosa pine habitat are 1-2 snags per acre in various shapes and sizes.

Townsend's big-eared bats hibernate and roost in caves or other cave like features. These big-eared bats have been captured on the Kaibab Plateau and within the project area. NKRD survey data shows that in 1996, 2004, and 2010 big-eared bats were captured at West Lake. South of Flagstaff, Arizona Townsend's big-eared bats were captured in ponderosa pine-oak woodlands (Morrel et al. 1999) which is a similar habitat to the southern, higher elevation of Burnt Corral.

#### **Direct and Indirect Effects**

##### *Proposed Action*

Direct effects to bats may occur due to snags being lost to fire, wind, or being felled for safety concerns during project activities. Prescribed burning and managed wildland fire would create new snags; however, they are typically smaller in size and bats prefer large snags to use as roost sites (Chambers et al. 2002). Snags would be maintained at 1-2 acres in accordance with KNF Desired Conditions. Prescribed burning may result in a temporary loss of foraging habitat. Short-term indirect effects would result from vegetation modification activities such as thinning and broadcast burning. These activities would disturb or remove understory vegetation, in effect reducing availability to insects. However, Waltz and Covington (2004) found a marked increase in butterfly (lepidopteron), the main prey species of Pale Townsend's big-eared bat in thinned and burned areas. Overall benefits in treatment areas would occur due to the reduction of dense forest canopy and increased growth in the herbaceous vegetation on the forest floor for the proposed action alternative. The resulting groups of trees interspersed with openings and interspaces would encourage the development of understory vegetation, increasing availability of food for these species over the long-term. Furthermore Abella et al. (2006) found that understory biomass can be >10 times higher in remnant and restored openings.

##### *No Action*

Bats would not be impacted by loss of snags and short-term prey reductions if no action were taken, except in the event of a large high-intensity wildfire. Foraging bats would not benefit from the proposed increase in open forest conditions and associated prey availability. No action would result in increased probability of high-intensity wildfire similar to the 2006 Warm Fire. The Warm Fire, and similar early successional habitats, likely benefit foraging bat species. However, after the influx of snags created during the crown fire have lost their bark, the area would not have suitable large roosting snags for a century or more.

### Determination

The proposed action would not cause a trend towards future listing of the three forest sensitive bat species. It may result in short-term reduction in prey and some loss of large snags but have long term benefits due to enhanced prey populations associated with herbaceous vegetation.

### Rare and Narrow Endemic Species for the Kaibab National Forest

The Kaibab's LRMP (USDA 2014) provides desired conditions and guideline for the protection of rare and endemic species on the forest. Table 5 shows which terrestrial species are considered rare and endemic on the forest and whether they are located within the Burnt Corral analysis area. Forest plan direction suggests project design should protect and provide for rare and narrow endemic species where they are likely to occur. For species not located within the analysis area, no further documentation is required within this document.

**Table 5.** Forest Planning Species classified as having Restricted Distributions or Narrow Endemic species

Species	Rare	Narrow Endemic	Species or Habitat in Project Area	Comments
Arizona black rattlesnake <i>Crotalus cerberus</i>	X		No	Found on south side of Grand Canyon
Utah Mountain kingsnake <i>Lampropeltis pyromelana infralabialis</i>	X		Habitat	Not detected on NKRD but in Utah, they have been found in sagebrush, ponderosa pine and Douglas fir
Persephone's darner <i>Aeshna persephone</i>	X		No	Riparian habitat required
Kaibab fairy shrimp <i>Branchinecta kaibabensis</i>		X	Habitat	Is covered in Sensitive Species section
Kaibab variable tiger beetle <i>Cylindera terricola kaibabensis</i>		X	No	Only found on south end of the District (Stevens and Ledbetter 2012)
Kaibab Indra swallowtail <i>Papilio indra kaibabensis</i>		X	No	Likely range in NKRD is the southern and eastern boundary areas, along and below canyon rims (Stevens and Ledbetter 2012).
House Rock Valley chisel-toothed kangaroo rat <i>Dipodomys microps leucotis</i>		X	No	Only found in House Rock Valley
Kaibab least chipmunk <i>Neotamias minimus consobrinus</i>		X	Habitat	Associated with high elevation spruce-fir forests
Kaibab northern pocket gopher <i>Thomomys talpoides kaibabensis</i>		X	No	Only associated with meadows on the District (Bergamini et al. 2014)

## Utah Mountain Kingsnake

### Existing Condition

The range of this subspecies is from the northwest corner of Arizona northward to the Great Salt Lake, and to eastern Nevada. Utah Mountain Kingsnake has not been located on the NKRD. Limited reports of this subspecies have been observed at the neighboring north rim of the Grand Canyon National Park and on the Arizona Strip of northwestern Arizona. They can be found in mountainous terrain from chaparral and pinyon-juniper woodlands to ponderosa pine-Douglas fir woodlands (Bergamini et al. 2014). Utah Mountain kingsnakes are typically located in rocky areas near water (Koenig 2002).

### Direct and Indirect Effects

#### *Proposed Action*

It is unknown if this subspecies is sensitive to clearing, thinning or prescribed fire (Bergamini et al. 2014). The most likely habitat within the project area is rocky areas associated with steep slopes on the west and east sides of the project area. Mechanical thinning would not be conducted on slopes 40% or greater, except by low-ground pressure equipment in association with wildland fire preparations. Another potential habitat is brush or burn piles, and snakes may be affected by burning activities. However, piles are typically burned when snow is on the ground, and snakes are likely in hibernacula.

#### *No Action*

Due to the limited knowledge regarding this subspecies, it is difficult to assess the impact of no action. However, in the event that a large high-intensity wildfire were to occur, it's likely this subspecies would be negatively impacted, at least in the short-term, due to lack of prey and/or direct mortality from fire.

### Determination

The proposed action would not cause a trend toward future listing of the Utah Mountain Kingsnake. It is unknown if this subspecies occurs in the project area (or on the NKRD), and the most suitable habitat would not be treated with mechanical thinning.

## Kaibab Least Chipmunk

### Existing Condition

The range of this subspecies of Least Chipmunk extends from northern Arizona through much of Utah and Colorado, extending into Idaho, Wyoming, and Montana (Bergamini et al. 2014). The Kaibab plateau represents the periphery of its relatively wide range. They can be found in rocky areas and open areas within spruce fir forests and have been observed on the NKRD and the neighboring lands of the Grand Canyon National Park (Hoffmeister 1986). Limited habitat for this subspecies may exist in the southern higher-elevation area of the project area.

### Direct and Indirect Effects

#### *Proposed Action*

The Fire or mechanical thinning may result in mortality of individuals. However, the thinning and wildland fire associated with the Burnt Corral project are an attempt to restore historic fire and stand conditions and would likely benefit this subspecies overall (Bergamini et al. 2014).

#### *No Action*

Due to the small amount of potential habitat within the project area, the effects of the no action alternative would be similar to the proposed action with the exception of the increased likelihood of high-intensity wildfire associated with no action, which may adversely affect this subspecies by eliminating its habitat.

### Determination

The proposed action would not cause a trend toward future listing of the Kaibab Least Chipmunk. A small amount of mixed conifer habitat exists in the project area (approximately 360 acres), thus impacts to habitat would be negligible. Overall, this subspecies would benefit from reduced probability of high-intensity wildfire.

## Migratory Birds

### Existing Condition

Executive Order 13186 (January 10, 2001) requires federal agencies to consider management impacts to migratory birds to further the purposes of the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and other laws. Federal agencies need to identify whether unintentional take would occur, and if so, whether such take would have a measurable negative effect on migratory bird populations. Take is defined to mean "... to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR 10.12). Removal or destruction of vegetation is not considered a taking.

Current direction from the Forest Service Southwestern Region Office to meet the objectives of E. O. 13186 is to address migratory birds by analyzing potential effects to: (1) Priority bird species identified in the Arizona Partners in Flight Bird Conservation Plan (Latta et al. 1999); (2) Important Bird Areas (IBAs) identified through the Audubon Society IBA program (3) known important or unique avian over-wintering areas and (4) identify the unintentional take of the Proposed Actions.

We considered potential effects of the Burnt Corral project on Arizona Partners in Flight (PIF) Priority Species (Latta et al. 1999) and U.S. Fish and Wildlife Service Birds of Conservation Concern (USFWS 2008). The NKRD is within the Southern Rockies Colorado Plateau (#16) bird conservation region. The forest developed a white paper to show which species are on the forest by vegetation type (Kaibab 2010).

The project area is 75% ponderosa pine and 23% pinyon – juniper. The species analyzed for these vegetation types include (1) pine habitat: northern goshawk, flammulated owl (*Psiloscops flammeolus*), Lewis's woodpecker (*Melanerpes lewis*), Grace's warbler (*Setophaga graciae*), Cassin's finch (*Haemorhous cassinii*), olive-sided flycatcher (*Contopus cooperi*), cordilleran flycatcher (*Empidonax occidentalis*), purple martin (*Progne subis*), and (2) pinyon-juniper habitat: gray flycatcher (*Empidonax wrightii*), pinyon jay (*Gymnorhinus cyanocephalus*), gray vireo (*Vireo vicinior*), black-throated gray warbler (*Setophaga nigrescens*), Bendire's thrasher (*Toxostoma bendirei*), and juniper titmouse (*Baeolophus ridgwayi*).

### Important Bird Areas

Two IBA have been designated adjacent to the NKRD. The Grand Canyon IBA and the Marble Canyon IBA are continuous, including all of Grand Canyon National Park, and the adjacent Vermillion Cliffs. These IBA are particularly important for California condor and serve as a major migratory corridor for raptors. The proposed project activities would not affect the viability of these IBA or the habitat characteristics therein.

### Overwintering areas

Important overwintering habitat generally consists of large wetlands. Because the North Kaibab Ranger District does not contain any large wetlands, significant concentrations of birds do not winter on the District; neither do unique species or a high diversity of species. However, water sources such as the smaller natural lakes, dirt tanks, and other developed waters on the NKRD may provide suitable overwintering habitat in small areas. The proposed action includes mitigation measures for soil and watershed that would protect these resources from being affected.

### Direct and Indirect Effects

#### Proposed Action

Project implementation activities would provide a risk of incidental mortality of birds due to the use of heavy equipment and running over or into nests, felling of trees during thinning, and prescribed burning. These activities could cause the loss of eggs or nestlings. The level of incidental mortality caused by project implementation activities would be proportional to how many acres are treated during the spring nesting season of April, May, June, and July. Seasonal restrictions would limit project implementation activities between March 1 and September 30 in active goshawk nest areas, which would reduce potential of mortality for species listed in ponderosa pine habitat. Mechanical treatment would occur minimally within pinyon-juniper habitat. Most of the prescribed burning on the NKRD occurs after nesting season. Implementation would result in some level of incidental mortality (unintentional take) of some birds. Only a small percentage of habitats would be treated at any one time, particularly when considering the extent of these habitats forest-wide. Therefore, the removal of any eggs or fledglings would not result in a measurable negative effect to the bird populations listed above.



The project would modify migratory bird habitat. On the Kaibab and Coconino National Forests, Kalie and Rosenstock (2013) found that reduced canopy cover, increased density of large trees, and the presence of oak benefitted most species within ponderosa pine forest. The desired conditions for the Burnt Corral project would reduce canopy cover in some areas, stimulate oak regeneration, and large trees (> 18" DBH) would make up the majority of basal area. Hurteau et al. (2008) recommend that forest management strive for a mosaic of forest conditions, in consideration of the varied responses that different species of passerines have to different treatments. A variety of treatment types, including MSO recovery habitat, goshawk nest areas, steep slopes, gradients in fire intensity, and fire-only areas would create a mosaic of bird habitats within the project area.

#### *No action*

The no action alternative would result in increased likelihood of high-intensity crown fire, similar to the 2006 Warm Fire or the 1996 Bridger Knoll fire. Those fires have resulted in enhanced habitat for some species of migratory birds. Early successional habitat is favored by some bird species (Swanson et al. 2011). For example, the purple martin likely benefited from these fires due to their preference for open areas with snags. However, considering the increased likelihood of large fires in the southwest due to climate change, and the fact that the fires mentioned above have already created large areas of early successional habitat, it's important that mature ponderosa and pinyon juniper habitat is preserved on the NKRD to ensure a mosaic of habitats is available for a wide diversity of migratory bird species.

#### **Determination**

The proposed action may result in the incidental mortality of nesting birds and/or disturbance of individual birds in the short term. In the long term, proposed actions would help create a mosaic of migratory bird habitats and help preserve mature forest habitat types by mitigating the risk of high-intensity wildfires.

### **Specially Designated Areas**

#### **Grand Canyon Game Preserve**

##### **Existing Condition**

Burnt Corral lies within the Grand Canyon Game Preserve (GCGP) that was established by President Theodore Roosevelt in 1906 to protect game species and their habitat on the Kaibab Plateau (Painter 2009). The Presidential Proclamation does not provide management guidelines but Section 1 of the Act states "The Reserve should be set aside for the protection of game animals and be recognized as a breeding place therefore". The Kaibab Plateau is a part of Game Management Unit 12A and Burnt Corral lies wholly within the unit 12A West. Primary game species within 12A West are mule deer (*Odocoileus hemionus*) and Merriam's turkey (*Meleagris gallopavo merriami*). Desired Conditions for the GCGP from the Forest Plan (2014) are to provide quality habitat for game species and to provide a variety of vegetation types in various stages to provide a range of habitat for native and desired nonnative wildlife species, including natural predators.

#### **Direct and Indirect Effects**

##### *Proposed Action*

Thinning and wildland fire may result in short term adverse effects to individual game animals but would not threaten populations within the GCGP. By restoring the fire regime and stand conditions of the project area, game species may benefit due to greater amounts of aspen, oak, and understory herbaceous vegetation. Germaine et al. (2004) found that similar forest treatments, at nearby Mount Trumbull, resulted in reduced availability of concealment cover but greater availability of foraging microhabitat. Similarly, Wakeling et al. (1998) found that turkey nest sites had greater horizontal cover than surrounding ponderosa pine forest in north-central Arizona. The mosaic of different treatment types proposed would improve forage conditions for game species, while retaining denser areas necessary for cover.

##### *No Action*

The no action alternative would likely result in increased concealment cover, but diminished forage availability due to increasing canopy density. These conditions are not sustainable and would eventually lead to high-intensity wildfire similar to the 2006 Warm Fire and 1996 Bridger Knoll Fire. Mule deer have benefitted from these fires due to increased forage opportunities, particularly where mid-story and upper story vegetation species have recovered. Turkeys rely on large roosting trees, so large areas of crown fire would reduce habitat suitability for this species.

### Determination

The proposed action would not threaten populations of game animals within the GCPC. It would enhance herbaceous vegetation while maintaining areas for concealment. The conditions of the Game Preserve have been satisfied by assuring habitat conditions for these species are preserved.

### Kaibab Squirrel National Natural Landmark

#### Existing Condition

The Kaibab Squirrel National Natural Landmark (NNL) was designated in 1965 and is primarily the ponderosa pine habitat of the Kaibab Plateau for which the Kaibab squirrel (*Sciurus aberti kaibabensis*) is strongly associated (Dumas and Koprowski 2014). National Natural Landmarks are natural areas that have been designated by the Secretary of the Interior as best examples of ecological and geological features that represent natural history and to preserve these areas to enhance scientific and educational value, to strengthen appreciation, and to conserve natural heritage. The Kaibab Squirrel NNL totals almost 295,000 acres and about 200,000 of those acres are on the NKR. The Burnt Corral project area is majority NNL (24,200 acres) with the exception of the northwestern corner. Desired Conditions for the NNL from the Forest Plan (2014) are to provide quality ponderosa pine habitat. Research has shown that the best habitat for Kaibab squirrel is intermediate-aged forest (trees 9-18 inches DBH), intermixed with larger trees, where groups of trees have crowns that are close together or interlocking. It also depends on the upper layer of the forest floor associated with tree litter, roots, and mycorrhizal fungi. Because Kaibab squirrels do not cache cones, they also depend on mature trees to provide cones as a year-round food source.

#### Direct and Indirect Effects

##### *Proposed Action*

Mechanical treatments and wildland fire may directly affect Kaibab squirrels with potential for mortality and/or disturbance associated with mechanical treatments and wildland fire. Kaibab squirrels may also be affected by alterations of its habitat. Patton et al. (1985) recommended leaving groups of trees around nest trees, feed trees, and water sources. Loberger et al. (2011) recommended leaving dense patches of trees with canopy cover 51-75%. The vegetation management efforts for Burnt Corral are focused on returning the ponderosa pine forest to conditions that more closely resemble pre-settlement conditions. The proposed action would establish clumps and groups in a fashion that forms a mosaic at the fine and mid-scale, with some continuous areas of interlocking crowns.

##### *No Action*

Squirrels would not be impacted by mechanical treatment or fire, except in the event of a wildfire. The no action alternative would increase the potential for high-severity wildfire, which would eliminate tree squirrel habitat.

### Determination

The proposed action would have no long-term adverse effects on the habitat or population of Kaibab squirrel. The conditions of the Kaibab Squirrel NNL have been satisfied by the design and provisions of this project to provide protection for the squirrel and its habitat by assuring habitat conditions continue for reproduction as provided by the Secretary of the Interior.

### Cumulative effects

Forest types are highly influential to the wildlife species that inhabit them and play a significant role in habitat suitability. Most of the BCVMP is within ponderosa pine forest, and 98% of proposed mechanical treatments occur within ponderosa pine forest. Considering this, cumulative effects in ponderosa pine forest are most relevant to this analysis. There are an estimated 160,500 acres of existing ponderosa pine forest on the NKR. Table 6 provides a summary of past, present, and reasonably foreseeable projects within NKR existing ponderosa pine forest that are considered in this cumulative effects analysis in addition to the proposed action. The current plan for the project area would include re-entry to the area in about 25 years for site-specific management (mechanical or fire) where necessary (BCVMP Vegetation Resource Specialist Report). Given this time frame, the Cumulative Effects period for analysis is 25 years into the past, and 25 years into the future.

**Table 6.** Cumulative actions table for past, present and reasonably foreseeable future actions within NKR existing ponderosa pine forest.

Project Name	Project Type	Acres (Approx)	Project Description
<i>Mechanical Treatment</i>			
Burnt Saddle/Pine Hollow/Lookout	Mechanical treatment (past)	9,500 acres ponderosa	Past commercial treatments from within the BCVMP project area
Jacob Ryan Vegetation Management Project	Mechanical treatment (past/present)	12,000 acres ponderosa	Commercial/non-commercial mechanical treatment based on northern goshawk habitat strata of ponderosa pine.
Moquitch Wildlife Habitat Improvement	Thinning (past)	500 acres ponderosa	Thin ponderosa pine up to 12" DBH
PFFPP Big Saddle Thinning	Thinning (past/present)	600 acres ponderosa	Thin ponderosa pine from 2-9" DBH.
<i>Managed and Rx Fire</i>			
Burnt Complex	Managed fire (past)	3,900 acres ponderosa	Wildland fire managed for resource benefit. Fire was managed to thin fuels in the area. Project was in the southern portion of the BCVMP within ponderosa pine forest.
Moquitch Wildlife Habitat Improvement	Managed and Rx fire (past)	9,500 acres ponderosa	Implement managed and Rx fire.
Jacob Ryan Vegetation Management Project	Managed and Rx fire (past/present)	25,000 acres ponderosa	Implement managed and Rx fire.
Kaibab Plateau Ecosystem Restoration Project (KPERP)	Non-commercial thinning, managed fire, and Rx fire. (future)	440,000 acres (all forest types)	Implement managed and Rx fire and non-commercial thinning throughout the entire forest, excluding the wilderness areas and the BCVMP.

Burnt Saddle, Pine Hollow, Lookout are past mechanical treatments within Burnt Corral that covered approximately 9,500 acres of commercial treatments, including even-aged regeneration treatments that have established young forest. There were intermediate thinning treatments on about 85% of the acres commercially harvested. The cumulative benefits from past management include gaps and open areas where crown fire would drop to the surface.

The Jacob Ryan Vegetation Management Project is an ongoing project in the north-central portion of the Kaibab plateau within the ponderosa pine forest type. The project follows criteria in the previous iteration of the LRMP. It includes commercial and noncommercial mechanical treatments, as well as managed and prescribed burning.

Moquitch Wildlife Habitat Improvement is a restoration project that thinned 500 acres of fire-prone small diameter trees, with managed and prescribed burning on an additional 9,500 acres.

The Big Saddle unit of the Plateau Facilities Fire Protection Project (PFFPP) is located adjacent to the southwestern portion of the BCVMP boundary. This project consists of thinning smaller diameter Ponderosa Pine to protect the areas surround Big Saddle cabin.

The Burnt Complex wildfire was a naturally ignited wildfire that originated within the southern portion of the BCVMP boundaries. The fire was managed within a 3900-acre planning area. The fire was managed to move the area towards a more fire adapted ecosystem by thinning the smaller diameter trees and leaving the more fire-resistant larger trees.

The Kaibab Plateau Ecosystem Restoration Project (KPERP) is a proposed large landscape scale project that covers the entire NKRD except the designated wilderness areas and the BCVMP. This project is designed around the use of prescribed fire and non-commercial thinning throughout most of the forest. The project would move fire adapted

forest types, including ponderosa pine, toward LRMP desired conditions with less risk of catastrophic stand replacing events. Like the BCVMP, the KPEP would include design criteria to protect wildlife.

## Effects Analysis

The following sections describe overall cumulative effects to wildlife. Table 7 summarizes species specific cumulative effects.

### Mechanical Treatment

Due to the limited amount of infrastructure on the NKRD, the PFFPP project is limited in size and effects. Mechanical treatments during Moquitch were also limited in size and restricted to thinning smaller trees. The treatment effects to species from Jacob Ryan are very similar to the species effects discussed above for BCVMP. Although BCVMP would follow the desired conditions from an updated version of the LRMP (2014), compared to Jacob Ryan, both projects seek to restore the uneven-aged stand conditions and frequent-fire regime of ponderosa pine forests. Also, both projects have multiple treatment types resulting in a mosaic of habitat conditions and seek to protect snags.

Cumulative effects associated with mechanical treatment for projects listed above occur on approximately 28,000 acres, which is less than one fifth of the ponderosa pine forest on the NKRD. Furthermore, treatments have occurred and are planned for only a portion of the 28,000 at a time. Short-term treatment effects, such as mortality and disturbance from noise and smoke would only occur during, or soon after treatments. Considering this, cumulative short-term effects would not negatively affect wildlife species analyzed for this project. Cumulatively, many species, as discussed above, would benefit from more open forest conditions and associated increase in herbaceous vegetation. The project in the cumulative effects area would reduce the potential for high-intensity wildfire within ponderosa pine, ensuring this forest type is available to wildlife species.

### Managed and Rx Fire

The cumulative effects of managed fire and prescribed fire in ponderosa pine (Burnt Complex, Jacob Ryan, KPEP) would be very similar to those resulting from the wildland fire proposed in the BCVMP and have been analyzed above. A frequent fire interval of 0-35 years is the desired condition for ponderosa pine (USDA 2014). The KPEP and the BCVMP would strive to meet this desired condition for all ponderosa pine, except where other conditions conflict with this goal (i.e. wildland-urban interface).

**Table 7.** Cumulative effects to species for which direct and indirect effects were analyzed above.

Species	Status	Cumulative Effects
California condor	Experimental population, non-essential	Due to proposed and ongoing mitigation measures, because nesting areas do not occur within NKRD ponderosa pine, and the wide foraging range of this species, cumulative effects would be minimal. Condor may benefit from enhanced availability of carrion associated with desired forest conditions.
Mexican spotted owl	Threatened	NKRD ponderosa pine forest is not Critical Habitat for this species. Therefore, cumulative effects are minimal.
Bald eagle	Sensitive	Desired conditions of 1-2 large (18" DBH minimum) per acre, particularly in sheltered areas, would ensure winter roosting habitat for the bald eagles. The NKRD does not have any nesting habitat. Cumulative effects would not affect the regional distribution of this species.
Northern goshawk	Sensitive	Measures to protect active nests and nesting areas (see above) would ensure that life history needs are met in treated areas. Species benefits from efforts to mitigate the risk of high-intensity wildfire, which have eliminated large areas of northern goshawk habitat on the NKRD.
American peregrine falcon	Sensitive	No cumulative effects to nesting habitat or regional distribution of this species. Peregrine falcons benefit from more open forest conditions resulting from treatments due to enhanced foraging opportunities.

Kaibab fairy shrimp	Sensitive	Soil and watershed mitigation measures for past, present, and reasonably foreseeable projects minimize negative effects associated with erosion.
Spotted bat	Sensitive	Species may benefit from openings created during treatments due to enhanced insect abundance. No cumulative affects to hibernating, breeding, or roosting habitat.
Allen's lappet-browed bat	Sensitive	Desired conditions of 1-2 large (18" DBH minimum) per acre would reduce negative cumulative effects to breeding and roosting habitat. Species may benefit from openings created during treatments due to enhanced insect abundance.
Pale Townsend's big-eared bat	Sensitive	Species may benefit from opening created during treatments due to enhanced insect abundance. No cumulative affects to hibernating, breeding, or roosting habitat.
Utah mountain Kingsnake	Rare and Narrow	Limited habitat and no detections for this subspecies on the NKRD. Steep rocky areas most likely habitat, which receive no mechanical treatment. Cumulative effects would not affect distribution of this subspecies.
Kaibab least chipmunk	Rare and Narrow	Ponderosa pine forests in northern Arizona are not suitable habitat for this subspecies. Therefore, cumulative effects are minimal.
Migratory birds	MBTA	Mosaic of habitat conditions achieved through a variety of mechanical treatment and managed wildland fire. Early-successional habitats available due to high-intensity wildfire. Treatments reduce potential for high-intensity fire, ensuring mature ponderosa pine forest is available for migratory birds. Cumulative effects would not affect distribution of migratory bird species.
Game species	GCGP	Mule deer and turkeys benefit from cumulative effects associated with open forest conditions and associated enhanced herbaceous forage. The mosaic of conditions derived from multiple treatment types, including fire, reduce negative effects associated with reduction in cover.
Kaibab squirrel	NNL	Treatments with uneven-aged management with groups of trees with interlocking crowns, with some large trees, have and would minimize cumulative effects to Kaibab squirrel habitat.

## Climate Change

Restoration projects such as this may help species be more resilient and adapt to climate change (USDA 2011). Climate change would cause a decrease in precipitation, an increase in drought, higher temperatures, and a longer wildfire season, which would increase the probability of stand-replacing wildfire causing habitat loss for the species. Climate change would also lead to more opportunities for invasive species to establish and spread, and invasive species may outcompete with these species or their prey, or they may alter the species' habitat (USGCRP 2009).

A more immediate threat of climate change is the loss of snags; as noted above snags are an essential habitat component for many species. It is unknown at the time of this report whether the drought that has occurred for the last three years has reached the point as to have an effect on snags as seen in 2012 by Ganey and Vojta (2014). Snag retention during mechanical vegetation treatments and the potential for snag creation by fuel treatments may offset this trajectory.

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Appendix A  
*Wildlife Mitigation Measures*

California Condor

- Prior to the start of project activities, the NKRD will contact personnel monitoring condor locations and movement to determine the locations and status of condors in or near the project area.
- All workers at the project site will be instructed to avoid interaction with condors and to immediately contact a FS wildlife biologist if condor(s) occur at the project area.
- Any project activity that may cause imminent harm to condors will temporarily cease until a FS wildlife biologist can assess the situation and determine the correct course of action.
- The project area will be kept clean of trash in order to minimize the possibility of condors accessing inappropriate materials.
- All vehicle fluid-leakage will be cleaned up immediately.
- If condors consistently occur at the project area, or nest within 1 mile, then additional conservation measures may be necessary. NKRD will report consistent condor occurrence at the project area to the Fish and Wildlife Service (FWS) in a timely manner and will facilitate any necessary consideration of additional measures by NKRD and the FWS.
- Smoke from project activities will be prevented from negatively affecting condor breeding.

Mexican Spotted Owl

- Retain trees >12" within recovery habitat.

Northern Goshawk

- Potentially disturbing project-related activities will be restricted within 300 yards of active nests between March 1 and September 30.
- Retain trees >14" within existing and replacement nest areas.

Other Raptors

- Potentially disturbing project-related activities will be restricted within 300 yards of active nests between April 1 and August 15.

Bats

- Retain 1-2snags/acre, particularly those near water